



TETRA TECH

April 22, 2010

Mr. Roy Crossland
START Project Officer
U.S. Environmental Protection Agency, Region 7
901 North 5th Street
Kansas City, Kansas 66101

Subject: Quality Assurance Project Plan
Radiation – Kelley Instruments, Inc., Wichita, Kansas
CERCLIS ID: KSN000706130
U.S. EPA Region 7 START 3, Contract No. EP-S7-06-01, Task Order No. 0176
Task Monitor: James Johnson, On-Scene Coordinator

Dear Mr. Crossland:

Tetra Tech EM Inc. is submitting the attached Quality Assurance Project Plan for the Radiation – Kelley Instruments, Inc., site in Wichita, Kansas. If you have any questions or comments, please contact the project manager at (816) 412-1775.

Sincerely,

for Robert Monnig, PE
START Project Manager

for Ted Faile, PG, CHMM
START Program Manager

Enclosures

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**QUALITY ASSURANCE PROJECT PLAN
FOR RADIATION – KELLEY INSTRUMENTS, INC.
WICHITA, KANSAS
CERCLIS ID: KSN000706130**

**Superfund Technical Assessment and Response Team (START) 3 Contract
Contract No. EP-S7-06-01, Task Order 0176**

Prepared For:

U.S. Environmental Protection Agency
Region 7
Superfund Division
901 N. 5th Street
Kansas City, Kansas 66101

April 22, 2010

Prepared By:
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415 Oak Street
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Radiation – Kelley Instruments, Inc. Site

Project Information:

Project Name: Radiation – Kelley Instruments, Inc. Site		County: Sedgwick	State: KS
EPA Project Manager: James Johnson		START Project Manager: Rob Monnig	
Approved By: <i>[Signature]</i>	Title: START Project Manager	Date: 4-22-10	Prepared For: EPA Region 7 Superfund Division
Approved By: <i>[Signature]</i>	Title: START Program Manager	Date: 4-22-10	
Approved By: <i>[Signature]</i>	Title: START QA Manager	Date: 4-22-10	
Approved By:		Prepared By: Rob Monnig	
Title: EPA Project Manager		Date: April 2010	
Approved By:		Tetra Tech START Project Number:	
Title: EPA Region 7 QA Coordinator		X9004.10.0176.000	

1.0 Project Management:

1.1 Distribution List

EPA—Region 7: James Johnson, EPA Project Managers Diane Harris, EPA Region 7 QA Coordinator	Tetra Tech START: Rob Monnig, Project Manager Kathy Homer, QA Manager
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1.2 Project/Task Organization

James Johnson, of the EPA Region 7 Superfund Division, will serve as the EPA project manager for the activities described in this QAPP. Rob Monnig, of Tetra Tech EM Inc., will serve as the START project manager for field activities.

1.3 Problem Definition/Background:

Description: This area-specific Quality Assurance Project Plan form is prepared as an addendum to the Generic Quality Assurance Project Plan for Superfund Integrated Assessment and Targeted Brownfields Assessment Programs (updated 2007), and contains site-specific data quality objectives for the sampling activities described herein.

☒ Description attached.

☐ Description in referenced report: _____
Title Date

1.4 Project/Task Description:

<input type="checkbox"/> CERCLA PA	<input type="checkbox"/> CERCLA SI	<input type="checkbox"/> Brownfields Assessment
<input type="checkbox"/> Other (description attached):	<input type="checkbox"/> Pre-CERCLIS Area Screening	<input checked="" type="checkbox"/> Removal Site Evaluation

Other Description:

Schedule: Field work is scheduled for the week of May 10, 2010, with completion anticipated within three to four days.

☐ Description in referenced report: _____
Title Date

1.5 Quality Objectives and Criteria for Measurement Data:

a. Accuracy:	<input checked="" type="checkbox"/> Identified in attached table.
b. Precision:	<input checked="" type="checkbox"/> Identified in attached table.
c. Representativeness:	<input checked="" type="checkbox"/> Identified in attached table.
d. Completeness*:	<input checked="" type="checkbox"/> Identified in attached table.
e. Comparability:	<input checked="" type="checkbox"/> Identified in attached table.

Other Description:

*A completeness goal of 100 percent has been established for this project. However, if the completeness goal is not met, EPA may still be able to make decisions based on any or all of the remaining validated data. Samples collected from residential properties will be considered "critical samples" because the results are crucial to accurately assess the overall threat(s) posed by the area to occupants of those residences.

1.6 Special Training/Certification Requirements:

☒ OSHA 1910 ☒ Special Equipment/Instrument Operator (describe below): ☐ Other (describe below):

Along with the training listed above, familiarization with radiation screening instrumentation and procedures will be necessary for the Tetra Tech START team.

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1.7 Documentation and Records:

- ☒ Field Sheets ☒ Daily Log ☐ Trip Report ☒ Area Maps ☐ Video
☒ Chain of Custody ☒ Health and Safety Plan ☒ Letter Report ☒ Photos
- ☒ Sample documentation will follow EPA Region 7 SOP 2420.05.
- ☒ Other: Analytical information will be handled according to procedures identified in Table 2.

2.0 Measurement and Data Acquisition:

2.1 Sampling Process Design:

- ☐ Random Sampling ☐ Transect Sampling ☒ Biased/Judgmental Sampling ☐ Stratified Random Sampling
☐ Search Sampling ☐ Systematic Grid ☐ Systematic Random Sampling ☒ Definitive Sampling
☒ Screening w/o Definitive Confirmation ☒ Screening w/ Definitive Confirmation
☒ Sample Map Attached
- ☒ Other (Provide rationale behind each sample): See Attachment A for additional sampling information.

The proposed sampling scheme will be judgmental, in accordance with the *Guidance for Performing Site Inspections Under CERCLA*, OSWER Directive #9345.1-05, September 1992, and *Removal Program Representative Sampling Guidance, Volume 1: Soil*, OSWER Directive 9360.4-10, November 1991. Judgmental sampling is the subjective (biased) selection of sampling locations based on historical information, visual inspection, and the best professional judgment of the sampler(s). Interiors of buildings at the site will be screened for alpha, beta, and gamma activity with real-time instruments. Passive air samples may also be collected from the buildings for laboratory analysis for radon. Wipe samples may also be collected from interior surfaces for field screening for gross alpha and beta activity and/or laboratory analysis for radionuclides. Surface and subsurface soil will be field screened for gamma radiation with real-time instruments, with soil samples submitted for laboratory radionuclide analysis. See Appendices A and B for additional site-specific information and a site location map.

Sample Summary Location	Matrix	# of Samples*	Analysis
Exterior Areas	Soil	10	Radionuclides (gross alpha/beta, gamma spectrometry, radium-226, thorium, and uranium)
Interiors of On-Site Buildings	Air	2	Radon
Interiors of On-Site Buildings	Wipe	10	Radionuclides (gross alpha/beta, gamma spectrometry, and radium-226)
Groundwater – temporary monitoring wells	Water	12	VOCs, gross alpha/beta, radium-226, radium-228

*NOTE: Background/QC samples are not included with these totals. See Table 1 for a complete sample summary.

2.2 Sample Methods Requirements:

Matrix	Sampling Method	EPA SOP(s) or other Method
Soil	Soil samples will be collected in disposable polyvinyl chloride (PVC) sleeves inserted into Geoprobe® Macro-Core samplers, which will be manually or mechanically driven to desired sampling depths. Soil will be collected from the sleeves using disposable stainless steel spoons and transferred to appropriate sample containers. Surface soil samples may also be collected directly using stainless steel spoons and transferred to appropriate sample containers.	SOP 4231.2012
Air	Electret ion chamber radon detectors (E-PERM®) will be deployed inside on-site building(s) to measure airborne levels of radon.	Indoor Radon and Radon Decay Product Measurement Device Protocols (EPA 402-R-92-004)
Wipe	Wipe samples may be collected from interior surfaces at the site if real-time survey data of interior areas do not indicate any impact from former site operations.	Field Operating Procedure #1, Wipe Sampling (see Appendix C)
Water – Temporary monitoring wells	Groundwater samples will be collected from Geoprobe® temporary monitoring wells. These groundwater samples will be collected through Geoprobe® rods via disposable polyethylene tubing and a check valve.	SOPs 4230.07 and 4230.15

☐ Other Description:

2.3 Sample Handling and Custody Requirements:

- ☒ Samples will be packaged and preserved in accordance with procedures defined in Region 7 EPA SOP 2420.06.
☒ COC will be maintained as directed by Region 7 EPA SOP 2420.04.
☒ Samples will be accepted according to Region 7 EPA SOP 2420.01.
☒ Other (Describe): Samples will be accepted according to procedures established by the START-contracted laboratory.

2.4 Analytical Methods Requirements:

- ☒ Identified in attached table.
☒ Rationale: The requested analyses have been selected based on historic information about the area and program experience with similar types of sites.
☐ Other (Describe):

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2.5 Quality Control Requirements:

- ☐ Not Applicable
- ☒ Identified in attached table.
- ☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated 2007).
- ☒ Field QC Samples: For this investigation, field QC samples will include one field blank (water) and one equipment rinsate blank (water), both prepared with deionized (DI) water provided by EPA Region 7 laboratory. The field blank will be collected to evaluate contamination of sampling containers and/or preservatives and to assess contamination potentially introduced during the sampling and laboratory procedure(s). The equipment rinsate will evaluate the effectiveness of decontamination procedures for Geoprobe® groundwater sampling equipment. In addition, one water trip blank will be prepared by the EPA Region 7 laboratory and be used to evaluate contamination introduced during transportation of the containers/samples. All QC samples will be submitted for the analyses listed in the attached tables. Evaluation of blank samples is dependent on the levels of contamination found in environmental samples to determine whether the environmental samples are representative. Analytical results of blank samples will be evaluated on a qualitative basis by the EPA Project Manager and EPA contractor(s) to determine a general indication of field-introduced and/or lab-introduced contamination.
- ☐ Other (Describe):

2.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements:

- ☐ Not Applicable
- ☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated 2007).
- ☒ Testing, inspection, and maintenance of analytical instrumentation will proceed in accordance with the previously referenced SOPs and/or manufacturers' recommendations. Testing, inspection, and maintenance of field instruments (radiation screening instruments, GPS units, etc.) will proceed in accordance with manufacturers' recommendations.

2.7 Instrument Calibration and Frequency:

- ☐ Not Applicable
- ☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated 2007).
- ☒ Calibration of laboratory equipment will be performed as described in the previously referenced SOPs and/or manufacturers' recommendations.
- ☒ Other (Describe): Calibration of field instruments (radiation screening instruments, etc.) will be conducted in accordance with manufacturers' recommendations.

2.8 Inspection/Acceptance Requirements for Supplies and Consumables:

- ☐ Not Applicable
- ☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated 2007).
- ☒ All sample containers will meet EPA criteria for cleaning procedures for low-level chemical analysis. Sample containers will have Level II certifications provided by the manufacturer in accordance with pre-cleaning criteria established by EPA in *Specifications and Guidelines for Obtaining Contaminant-Free Containers*.
- ☐ Other (Describe):

2.9 Data Acquisition Requirements:

- ☐ Not Applicable
- ☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated 2007).
- ☒ Previous data or information pertaining to the area (including other analytical data, reports, photos, maps, etc., that are referenced in this QAPP) has been compiled by EPA and/or its contractor(s) from other sources. Some of that data has not been verified by EPA and/or its contractor(s); however, that unverified information will not be used for decision-making purposes by EPA without verification by an independent professional qualified to verify such data or information.
- ☐ Other (Describe):

2.10 Data Management:

- ☒ All laboratory data acquired will be managed in accordance with Region 7 EPA SOP 2410.01.
- ☒ Other (Describe): All laboratory data acquired will be managed according to procedures established by the START-contracted laboratory.

3.0 Assessment and Oversight:

3.1 Assessment and Response Actions:

- ☒ Peer Review ☒ Management Review ☐ Field Audit ☐ Lab Audit
- ☒ Assessment and response actions pertaining to analytical phases of the project are addressed in Region 7 EPA SOPs 2430.06 and 2430.12.
- ☐ Other (Describe):

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3.1A Corrective Action:

- ☒ Corrective actions will be at the discretion of the EPA project manager whenever problems appear that could adversely affect data quality and/or resulting decisions affecting future response actions pertaining to the area.
- ☐ Other (Describe):

3.2 Reports to Management:

- ☐ Audit Report ☐ Data Validation Report ☐ Project Status Report ☐ None Required
- ☒ A letter report describing the sampling techniques, locations, problems encountered (with resolutions to those problems), and interpretation of analytical results will be prepared by START and submitted to the EPA.
- ☒ Reports will be prepared in accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated 2007).
- ☐ Other (Describe):

4.0 Data Validation and Usability:

4.1 Data Review, Validation, and Verification Requirements:

- ☐ Identified in attached table.
- ☒ Data review and verification will be performed in accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated 2007).
- ☒ Data review and verification will be performed by a qualified analyst and the laboratory's section manager as described in Region 7 EPA SOPs 2430.06 and 2430.12.
- ☒ Other (Describe): Data review and verification will be performed in accordance with procedures established by the START-contracted laboratory.

4.2 Validation and Verification Methods:

- ☐ Identified in attached table.
- ☐ The data will be validated in accordance with Region 7 EPA SOPs 2430.06 and 2430.12.
- ☒ The EPA project manager will inspect the data to provide a final review. The EPA project manager will review the data, if applicable, for laboratory spikes and duplicates, laboratory blanks, and field blanks to ensure the data are acceptable. The EPA project manager will also compare the sample descriptions with the field sheets for consistency, and will ensure appropriate documentation of any anomalies in the data.
- ☒ Other (Describe): The data will be validated in accordance with procedures established by the START-contracted laboratory.

4.3 Reconciliation with User Requirements:

- ☐ Identified in attached table.
- ☒ If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded and re-sampling or re-analysis of the subject samples may be required by the EPA project manager.
- ☐ Other (Describe):

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Table 1: Sample Summary

Project Name: Radiation – Kelley Instruments, Inc.				Location: Wichita, Kansas; see Appendix B, Figure 1			
START Project Manager: Rob Monnig				Activity/ASR #: To be determined			Date: April 20109
No. of Samples	Matrix	Location	Purpose	Depth or other Descriptor	Requested Analysis	Sampling Methods	Analytical Method
10	Soil	Areas on the subject property and adjacent properties	To determine the extent of contamination in soils by radionuclides	Surface soils (0-6 inches) and subsurface soils (depth based on real-time data in field)	Radionuclides (gross alpha/beta, gamma spectrometry, radium-226, thorium, and uranium)	EPA SOP 4231.2012	See table notes below
10	Wipe	Interiors of on-site building(s)	To assess levels of radionuclides in on-site buildings resulting from radium contamination on the property	N/A	Radionuclides (gross alpha/beta, gamma spectrometry, and radium-226)	FOP #1, Wipe Sampling (see Appendix C)	See table notes below
2	Air	Interiors of on-site building(s)	To measure airborne levels of radon.	N/A	Radon	EPA 402-R-92-004	None. Field measurement only.
12	Water	Geoprobe® temporary monitoring wells	To assess potential groundwater contamination from unknown sources	Temporary wells will be sampled approximately every 15 feet between about 15 and 45 feet below ground surface (bgs)	VOCs, Gross Alpha/Gross Beta, Radium-226, Radium-228	EPA SOPs 4230.07 & 4230.15	EPA SOP 3230.09 (VOCs), EPA Method 900.0 (Gross Alpha/Gross Beta), EPA Method 903.1 (Radium-226), EPA Method 904/9320 (Radium-228)
Background Samples							
4	Soil	Areas upgradient of the subject property	To assess background levels of radionuclides in area soils	Surface and subsurface soils	Radionuclides (gross alpha/beta, gamma spectrometry, and radium-226)	EPA SOP 4231.2012	See table notes below
QC Samples							
1	Water	Trip blank	To assess field/transportation-related contamination	N/A	VOCs	N/A	EPA SOP 3230.09 (VOCs)
1	Water	Rinsate blank	to assess adequacy of decontamination procedures	N/A	VOCs	N/A	EPA SOP 3230.09 (VOCs)
1	Water	Field blank	to assess field-introduced and laboratory-introduced contamination	N/A	VOCs	N/A	EPA SOP 3230.09 (VOCs)

Note:

Analytical Methods are as follows: gross alpha/beta (EPA 900.0/9310); gamma spectrometry (DOE HASL 300 4.5.2.3); radium-226 (by 21-day bismuth ingrowth and gamma spectroscopy); and total uranium and thorium (SW 846 3050B/6020).

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for the Radiation – Kelley Instruments, Inc. Site

Table 2: Data Quality Objective Summary

Project Name: Radiation – Kelley Instruments, Inc.				Location: Wichita, Kansas; See Appendix B, Figure 1					
START Project Manager: Rob Monnig				Activity/ASR #: To be determined				Date: April 2010	
Analysis	Analytical Method	Data Quality Measurements					Sample Handling Procedures	Data Management Procedures	
		Accuracy	Precision	Representativeness	Completeness	Comparability			
SOIL									
Radionuclides (gross alpha/beta, gamma spectrometry, radium-228, thorium, and uranium)	see Table 1	per analytical method	per analytical method	judgmental sampling based on professional judgment of the sampling team	100%; samples from the site are critical samples	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.	
AIR									
Radon	see Table 1	per analytical method	per analytical method	judgmental sampling based on real-time survey data of building interiors and professional judgment of the sampling team	100%; samples from the site are critical samples	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.	
WIPE									
Radionuclides (gross alpha/beta, gamma spectrometry, and radium-226)	see Table 1	per analytical method	per analytical method	judgmental sampling based on real-time survey data of building interiors and professional judgment of the sampling team	100%; samples from the site are critical samples	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.	
WATER									
VOCs, Gross Alpha/Gross Beta, Radium-226, Radium-228	see Table 1	per analytical method	per analytical method	biased/judgmental sampling based on professional judgment of the sampling team	100%; samples from private water wells are considered critical samples.	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.	

APPENDIX A

SITE-SPECIFIC INFORMATION FOR THE RADIATION – KELLEY INSTRUMENTS, INC. SITE

INTRODUCTION

The Tetra Tech EM Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) has been tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to conduct a Removal Site Evaluation (RSE) to determine the extent of radium contamination (and associated radionuclides) in surface and subsurface soils, groundwater, and interior buildings at the Radiation – Kelley Instruments, Inc. (Kelley Instruments) site in Wichita, Kansas. An aircraft instrument repair shop operated on the property from as early as 1971 to as late as 1990 under the name Kelley Instruments, Inc. (Kansas Department of Health and Environment [KDHE] 2007).

Results of an investigation that KDHE conducted at the Kelley Instruments site in March and May 2007 indicated the presence of radium in soil at the site. KDHE identified one area of elevated gamma activity on the facility located generally southeast of the northern building. According to KDHE, the highest field-measured surface reading showed 103 microRoentgens per hour ($\mu\text{R/hr}$) using a Ludlum model 44-2, with a 1- by 1-inch-diameter sodium iodide T1 scintillator probe (KDHE 2007). KDHE also collected and submitted soil samples to a laboratory for radium-226 analysis. The highest radium-226 concentration measured in soil was 102 picoCuries per gram (pCi/g) detected in a soil sample collected from 6 inches below ground surface (bgs) (KDHE 2007).

RSE activities will include real-time monitoring of soils for gamma radiation, and of interior surfaces for alpha, beta, and gamma activity. Soil samples will be collected for laboratory analysis for radionuclides and groundwater samples will be collected for laboratory analysis for radionuclides and volatile organic compounds (VOC). Electret ion chamber radon detectors (E-PERM[®]) may be deployed to verify that radon contamination is not present inside the buildings (radon is a daughter element resulting from decay of radium). (An “electret” is a substance with semi-permanent electrical polarization—an electrostatic equivalent of a permanent magnet.) To determine the presence of removable surface contamination, wipe samples may be collected for field screening alpha and beta activity and/or conducting laboratory analysis for radionuclides, based on professional judgment in the field. This quality assurance project plan (QAPP) identifies site-specific features and addresses elements of the sampling strategy and analytical methods proposed for this investigation. To determine whether and to what extent removal activities are required, an assessment of the data acquired during this RSE will proceed according to the National Oil and Hazardous Pollution Contingency Plan (NCP), 40 *Code of Federal Regulations* (CFR) 300.415(b)(2).

AREA LOCATION/DESCRIPTION

The former Kelley Instruments facility is located at 1024 South Santa Fe Avenue in Wichita, Kansas (see Appendix B, Figure 1). The site is in the northwest quarter of Section 28, Township 27 South, Range 1 East; the following geographic coordinates of its approximate center are: 37.673860 degrees north latitude and 97.329940 degrees west longitude (KDHE 2007). The approximately 1.5-acre site is located south of downtown Wichita, Kansas. Two buildings are located on the facility—a building located on the northern portion of the property, which covers approximately 6,000 square feet, and a building located on the southern portion of the property, which covers approximately 5,140 square feet. The Kelley Instruments site is located in a predominantly commercial/industrial area.

Surface soils at the site are mapped as Urban land-Elandco silty loam (0 to 60 inches in thickness). The Urban land-Elandco silty loam is described as a very friable, moderately to well-drained soil occurring in level urban or reworked areas. Air and water move through this soil type at a slow rate, and runoff is slow (KDHE 2007).

KDHE reports that shallow groundwater in the vicinity of the property occurs primarily in alluvial sand and gravel deposits. Where the sand and gravel is not present, groundwater is found in silt and clay alluvium. Depth to groundwater varies from 20 to 25 feet bgs in the area, and groundwater is assumed to flow primarily to the south (KDHE 2007).

SAMPLING STRATEGY AND METHODOLOGY

Under this task order, Tetra Tech START will conduct real-time monitoring and sampling to determine the extent of radionuclide contamination in surface and subsurface soils, in interior ambient air, and on interior surfaces of on-site structures. The proposed sampling scheme for this project is judgmental (based on the best professional judgment of the sampling team), in accordance with the *Removal Program Representative Sampling Guidance, Volume 1: Soil*, Office of Solid Waste and Emergency Response (OSWER) Directive 9360.4-10, November 1991.

Field procedures will follow standard operating procedures (SOP) outlined in the QAPP. Field activities will include on-site and off-site real-time monitoring of surface and subsurface soils, and collection of soil samples for laboratory analysis. Real-time monitoring of interior surfaces of on-site structures will also occur. Moreover, electret ion chamber radon detectors (E-PERM[®]) will be deployed in on-site structures to assess for indoor radium contamination that may have impacted indoor air quality. Wipe samples may

be collected to determine the presence of removable contamination. Descriptions of the sampling strategy and procedures are presented below.

Surface and Subsurface Soils – START will establish background levels of gross alpha, beta, and gamma activities and radium-226 by collecting surface and subsurface soil samples at one or more background locations selected by referencing topographic gradient, wind direction, and field survey results. Location coordinates will be determined using a Trimble global positioning system (GPS) unit and recorded in the field logbook. All background samples will be screened using a Ludlum Model 192 ratemeter to monitor gamma activity.

START will also survey all surface soils at the site for gross gamma activity using a Ludlum Model 2221 rate meter with a Ludlum Model 44-20 sodium iodide (NaI) scintillation detector. Survey personnel will scan 100% of the surface soil in a serpentine pattern. The detector will be held approximately 6 inches above ground surface while the surveyor moves the detector at approximately 1 to 2 feet per second. Each location at which measured gross gamma radiation exceeds twice background will be flagged for further investigation and possible soil sampling. The Ludlum detector will be coupled with a Trimble GPS unit and a notebook computer running Rapid Assessment Tool Software (RATS). The RATS system will collect and log detector readings and GPS locations, and will display the survey data in real time over aerial imagery. The resulting graphical illustration will be used to evaluate contamination distribution throughout the area of investigation.

The vertical extent of radionuclide contamination will be assessed in areas of elevated activity identified during the surface soil surveys. Within each area, soil borings will be advanced with hand augering or Geoprobe[®] equipment. Soil borings are not anticipated to exceed 12 feet bgs. Subsurface gamma activity will be logged through the interval of the boring using a Ludlum Model 44-62 NaI scintillation detector connected to a Ludlum Model 2241-3 ratemeter. Data generated from these borings will determine the quantity and sampling intervals of subsurface samples to be collected for the following laboratory analyses: gross alpha/beta, gamma spectrometry, radium-226, total uranium, and total thorium.

On-site Buildings – Interior surfaces of the on-site buildings will be field screened using a Ludlum Model 2241-2 ratemeter with a Ludlum Model 43-90 zinc sulfide (ZnS) scintillation detector (for alpha activity), Ludlum Model 44-116 plastic scintillation detector (for beta activity), and a Ludlum Model 44-10 NaI scintillation detector (for gamma radiation). A Ludlum Model 43-89 ZnS and plastic scintillation detector (for both alpha and beta activities) may be used in lieu of the Model 43-90 and Model 44-116 detectors.

Surfaces will be investigated by a combination of scanning surveys and static measurements. As indicated above, real-time instruments will scan select surfaces based on professional judgment in the field. Surfaces most likely contaminated will be selected—for example, a horizontal surface with high deposition of particulates. Where a scanning survey measurement indicates elevated contamination (above twice background), a static measurement may be taken to determine contaminant activity more accurately.

Monitoring for radon within the on-site buildings using electret ion chamber radon detectors (E-PERM[®]) may occur to determine whether radium, as progenitor of radon, may thus have impacted indoor air quality. The E-PERM[®] detectors will operate inside the on-site buildings for a minimum of two days.

Wipe samples may be collected for field screening and possible laboratory analysis, based on real-time survey data. Surfaces with the highest elevated contamination levels will be sampled, based on professional judgment in the field. Wipe samples submitted for laboratory analysis will be analyzed for gross alpha/beta, gamma spectrometry, and radium-226.

If the survey indicates no contamination, the interior of the buildings may be classified as Class 3 survey units for a Final Status Survey (FSS) in accordance with the Multi-Agency Radiation Survey and Site Inspection Manual (MARSSIM) (U.S. Environmental Protection Agency 2000).

Temporary Monitoring Well Sampling – Four temporary direct-push technology (DPT) borings will be advanced at the site to sample groundwater. The DPT borings will be advanced to a depth of approximately 45 feet bgs and will be sampled at approximately 15-foot depth intervals between the top of the groundwater and the bottom of the well in an effort to determine depth of contaminants. Samples will be collected with a Geoprobe[®] Screen Point 15 sampling apparatus containing either disposable, 4-foot-long, polyvinyl chloride (PVC) screens or a Geoprobe[®] reusable stainless steel screen. At each location, the sampler will be advanced to the maximum depth (approximately 45 feet bgs); then the screen will be exposed to the aquifer. After the screen is deployed at the bottom of the boring, a sample will be collected through disposable polyethylene tubing utilizing a check valve placed at the bottom of the tubing. The rod string will then be lifted to the other intervals, and the screen and tubing will be purged with groundwater from each interval prior to sampling. About 1 gallon of water will be purged from the well prior to sampling at each interval.

At each sampled interval, four 40-milliliter (mL) vials preserved with hydrochloric acid (HCl) will be collected for low-level VOC analysis by the EPA Region 7 laboratory. In addition, at each sample interval, a sample will be field-filtered and collected into a laboratory-supplied container and submitted to

the START-contracted laboratory for gross alpha/beta, gamma spectrometry, radium-226, and radium-228 analysis. The groundwater sampler and rods will be decontaminated between locations, and new tubing will be used at each well location.

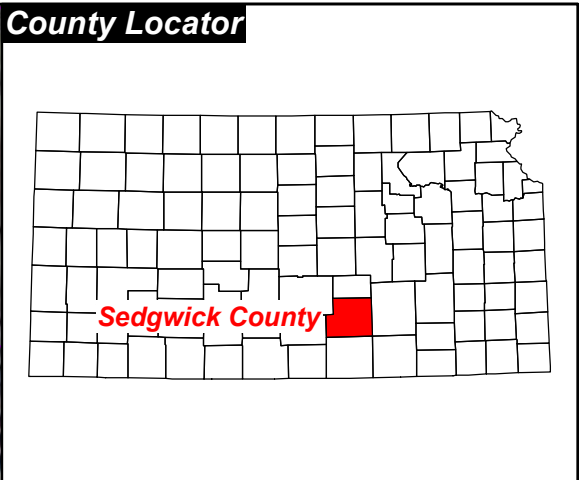
ANALYTICAL METHODS

Appropriate containers and physical and chemical preservation techniques will be employed during the field activities to help ensure acquisition of representative analytical results. Submittal of all samples to selected laboratories is expected in May 2010 for analysis according to the SOPs and methods referenced or described in the QAPP. Submittal of samples to a START-contracted laboratory for analysis is anticipated.

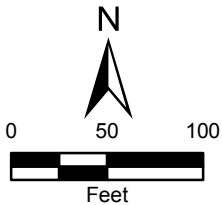
REFERENCES

- Kansas Department of Health and Environment (KDHE). 2007. Unified Focus Assessment Report, Kelley Instruments, Inc. (Former), 1024 South Santa Fe Avenue, Wichita, Kansas. June.
- U.S. Environmental Protection Agency. 2000. Multi-Agency Radiation Survey and Site Inspection Manual (MARSSIM), Revision 1. EPA 402-R-97-016, Rev. 1. August.

APPENDIX B
SITE LAYOUT MAP



- Legend**
- Major Road
 - Street
 - Facility Boundary
 - Parcel Boundary



Source: GlobeXplorer Aerial Imagery, DigitalGlobe, 2003;
Sedgwick County GIS, Property Parcels, 2010;
HSIP Gold, 2007.

Radiation – Kelley Instruments, Inc.
1024 S. Santa Fe Avenue
Wichita, Kansas

Figure 1
Site Layout Map



APPENDIX C

FIELD OPERATING PROCEDURE #1 – WIPE SAMPLING

Field Operating Procedure #1 Wipe Sampling



Step No.	WIPE COLLECTION
1	Use 47-millimeter (mm) diameter Whatman filter paper (Part No. FP2063-47) or similar, typically called a "wipe," for collection of surface contamination.
2	Number each wipe on the back of the filter prior to sample collection. The back of the filter is typically smoother than the front.
3	With moderate pressure, press the wipe onto the surface and move the wipe in an "S" pattern to cover a 10- x 10-centimeter (cm) area (or an area representing 100 cm ²) of the survey location. Use caution when collecting a wipe sample from rough surfaces (concrete, brick, etc.) that may tear the wipe. Use a 100-cm ² template cutout as a guide, if available (see photograph above); do not reuse templates.
4	Place the wipe in a glassine envelope (RSO, Inc., Stock No. AC-G3218), or similar envelope to protect the sample.
5	Record required sample information such as sample number, location, date, and time in the field logbook or designated field form.